

REMARKS

The pending Claims are 1, 6, 8, 9, 12-15, 20, 22, 25-29, 34, 36, and 39-41.

Claims 2-5, 7, 11, 16-19, 21, 24, 30-33, 35 and 38 are withdrawn.

Claims 10, 23, and 37 are canceled.

Applicants acknowledge the Examiner's withdrawal of the objection to Claims 13, 14, 26, 27, 40, and 41, and the withdrawal of the rejection over Doi et al. (EP 1138746).

The specification is amended to insert recitation to the provisional application, from which this application claims priority, and the corresponding priority date. No new matter is introduced.

Claims 1, 15, and 29 are amended to recite that the first-type inert spacer group is an alkyl chain of from 4 to 12 carbon atoms. Support for this can be found in original Claims 10, 23, and 37 (now canceled) and in the specification at pages 8-9, bridging paragraph. No new matter is introduced.

New drawing sheets are submitted herewith.

Objections to the Drawings

The Examiner has objected to the drawing for failing to comply with 37 C.F.R. 1.84(p)(5). Applicants submit that the new drawing sheets have overcome this objection, and respectfully request that it be withdrawn.

Rejections under 35 U.S.C. § 103

Applicants submit that below remarks provide a detailed explanation of why none of the cited references teach or suggest the pending claims. These remarks are provided with specific references to the independent claims, pending Claims 1, 15, and 29. Because the independent claims are directed to subject matter that is novel and would not have been obvious, the dependent claims are likewise patentable. Each cited reference is discussed in detail below.

(1) U.S. 2003/0091862 to Tokito et al. ("Tokito")

The Examiner has rejected Claims 1, 6, 8-10, 12-15, 20, 22, 23, 25-29, 34, 36, 37, and 39-41 under 35 U.S.C. § 103 (a) as having been unpatentable over *Tokito*. Applicants respectfully traverse this rejection.

The inventions of pending Claims 1 (composition), 15 (luminescent material), and 29 (device), as amended herein, are directed to subject matter comprising the following: (a) a

conjugated polymeric backbone; (b) a plurality of a first-type functional groups; and (c) a plurality of first-type inert spacer groups, wherein each of the plurality of first-type functional groups is covalently bound to at least one of the plurality of first-type inert spacer groups, which first-type inert spacer groups are covalently bound to the polymeric backbone, wherein at least one of the first-type inert spacer groups is an alkyl chain of from 4 to 12 carbon atoms. *Tokito* does not teach or suggest any subject matter with these elements.

In particular, *Tokito* discloses polymers having both phosphorescent units and carrier (*i.e.*, hole or electron) transporting units. The “phosphorescent site” is the portion of the phosphorescent unit emitting phosphorescence, and the “carrier transporting site” is the portion of the carrier transporting unit that transports a carrier. *See* paragraph 84 of *Tokito*, last sentence. As discussed in paragraph 84 of *Tokito*, there are four types of polymers are: (a) polymers where the phosphorescent sites and carrier transporting sites are both in the main chain of the polymer; (b) polymers where phosphorescent sites are in side chains and the carrier transporting sites are in the main chain; (c) polymers where the phosphorescent sites are in the main chain and the carrier transporting sites are in a side chain; and (d) polymers where both the phosphorescent sites and carrier transporting sites are in side chains. Examples of phosphorescent sites in *Tokito* include transition metal complexes and rare earth metal complexes. *See* paragraph 87 of *Tokito*. In polymer types (a) and (c) of *Tokito*, the metal complex is in the polymer backbone and is not covalently bound to a spacer group which is covalently bound to a polymer backbone, as recited in Applicants’ Claims 1, 15, and 29. These polymer types will not be considered further.

In polymer types (b) and (d) of *Tokito*, the phosphorescent metal complexes are in side chains. However, there is no teaching or suggestion in *Tokito* of attaching the metal complexes to *conjugated* polymeric backbones, as recited in Applicants’ Claims 1, 15 and 29. The Examiner cited paragraphs 92-94 in *Tokito* as a teaching of a “polymer of which a main chain is a conjugate system”. The Examiner further states that the “R groups of the above formula [polyfluorene] may include alkyl groups...per the ‘first-type inert spacer group’”. Applicants disagree with this characterization. Applicants note that *Tokito* actually states that divalent groups, such as polyfluorene (“FO”), “are incorporated into the main chain of the polymer *as* phosphorescent [*sic*, fluorescent] sites.” *See Tokito*, paragraph 94, last sentence. The R groups in the divalent FO group of *Tokito* can be alkyl or alkoxy groups, but these are substituents on the FO; such “R”s are not linking the polyfluorene to a metal complex, *i.e.*, not a first-type inert spacer group. *See Tokito*, Figure FO in paragraph 93. There is nothing in *Tokito* that teaches or suggests that one could attach a phosphorescent metal complex to a fluorene polymer, and certainly not using an inert space group as defined in pending Claims 1, 15 and 29.

Examples of polymeric fluorene in *Tokito*, are shown in the two copolymers in paragraph 106 (last two structure at pages 9 and 10) where both the fluorene and the iridium

ligand are in the polymer backbone (*i.e.*, a *Tokito* type (a) polymer) and neither copolymer has a first type inert spacer as recited in the pending claims.

Moreover, while the homopolymers of fluorene are taught to be useful as charge transport polymers in devices in paragraph 130 of *Tokito* (“CP2” on page 11 of *Tokito*), the *Tokito* homopolymers have no metal complexes of any variety. Again, *Tokito* provides no teaching or suggestion of a phosphorescent metal complex attached to a polyfluorene group in a polymeric backbone, without or without a spacer -- let alone a plurality of first-type inert spacer groups as presently claimed.

Applicants respectfully request that this rejection be withdrawn.

(2) U.S. 2002/0193532 to Ikehira et al. (“*Ikehira*”)

The Examiner has rejected Claims 1, 6, 8-10, 12-15, 20, 22, 23, 25-29, 34, 36, 37, and 39-41 under 35 U.S.C. § 103 (a) as having been unpatentable over *Ikehira*. Applicants respectfully traverse this rejection.

Ikehira describes a light emitting polymer having a particular molecular weight range with a metal complex in the main chain or a side chain. *Ikehira*, at paragraph 8. However, in the *Ikehira* polymer, the metal complex structure is connected to the main chain via “an atom such as oxygen atom, sulfur atom, selenium atom, etc.; a direct bond such as a single bond, and double bond; or a divalent group such as methylene group, alkylene group, arylene group, etc.” *Ikehira*, at paragraph 37. This is neither a teaching nor a suggestion of Applicants’ specific first-type inert spacer group, which is an alkyl chain of from 4 to 12 carbon atoms. In fact, *Ikehira* teaches that the linking group should be conjugated, as all of the examples shown on pages 7 and 8 of *Ikehira* have conjugation extending from the polymer to the metal complex.

Applicants respectfully disagree with the Examiner’s comments with respect to paragraph 48 of *Ikehira* (where the Examiner indicated that the R groups are “first-type inert spacer groups”). The R group of *Ikehira* in paragraph 48 refers to a *substituent* on an aromatic group [Ar₁] in *Ikehira* formula (1), as provided below.



In contrast to the “R” group of *Ikehira* as set forth above, Applicants’ first-type inert spacer group is a group that covalently connects the first-type functional group to the conjugated polymeric backbone. There is no teaching or suggestion in *Ikehira* of attaching functional groups to any or all of the substituents on the aromatic group of *Ikehira* and then complexing metals to the functional groups. And, there certainly is no teaching or suggestion of attaching a functional group on a metal complex to a first-type inert spacer group which is

an alkyl chain of 4 to 12 carbon atoms, as recited in Applicants' Claims 1, 15, and 29, as amended.

In addition, Applicants respectfully submit that there is no teaching in *Ikehira* of a polymer wherein the conjugated polymer backbone has a non-conjugated segment comprising recurring monomeric units selected from vinyl carbazolediyls and triarylmethanediyls, as recited in pending Claim 9.

Applicants respectfully request that this rejection be withdrawn.

(3) U.S. 2002/0028347 to Marrocco, III, et al. ("*Marrocco*")

The Examiner has rejected Claims 1, 6, 8-10, 12-15, 20, 22, 23, 25-29, 34, 36, 37, and 39-41 under 35 U.S.C. § 103 (a) as having been unpatentable over *Marrocco*. Applicants respectfully traverse this rejection.

At best, *Marrocco* is directed to a matrix comprising a polymer (of specific aromatic repeating units) and one or more fluorescent metal ions. See *Marrocco*, Abstract and paragraph 12. *Marrocco* further provides the polymer can have "functional groups, either side groups, or main chain groups, or end groups, that bind or coordinate to the luminescent metal ion or metal complex." *Marrocco*, at paragraph 33. However, there is no teaching or suggestion in *Marrocco* of having a first-type insert spacer group between the polymeric backbone and the functional group. To the contrary, the only examples in *Marrocco* have the functional group in the polymer backbone. See, e.g., *Marrocco*, at paragraphs 40 and 41.

The Examiner has pointed to claim 1 of *Marrocco*, formula II, as reading upon the first-type inert spacer group when A is alkyl. Applicants' respectfully disagree. When A in *Marrocco* formula II is CR₁R₂, and R₁ and R₂ are alkyl, the result is an alkyl substituted polyfluorene. The composition of claim 1 in *Marrocco* further includes one or more luminescent metal ions or luminescent metal ion complexes. But, there is no teaching or suggestion in *Marrocco* to link the metal ion or metal complex to the alkyl substituent of the polyfluorene.

The Examiner has pointed to claim 27 of *Marrocco* as showing that a polarizable ligand may be part of a polymer chain. While this may be true, *Marrocco* does not teach or suggest in claim 27, or anywhere else, that the polarizable ligand should be attached to a first-type inert spacer group that is attached to a conjugated polymer backbone. It is respectfully submitted that *Marrocco* does not teach or suggest a spacer group which is an alkyl chain having from 4 to 12 carbon atoms, as recited in Applicants' Claims 1, 15, and 29, as amended.

Applicants respectfully request that this rejection be withdrawn.

Conclusion

In view of the foregoing amendments and remarks, a Notice of Allowance for Claims 1, 6, 8, 9, 12-15, 20, 22, 25-29, 34, 36, and 39-41 is earnestly requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Mary Ann Capria', is written over the printed name.

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INFORMATION PAGE

I. Amendments to Claims:

All claims must be listed.

Claims not amended must be CLEAN.

Amendments are made by underlining (insertions), strikeouts (deleted).

Status Identifiers that May be Used (Acceptable Parentheticals):

In order to promote uniformity and consistency, only the following parenthetical expressions are the ONLY acceptable expressions to be used to indicate the status of the claims (in parenthesis after the claim number):

i. (Original):	Followed by the text of the claim as originally presented.
ii. (Currently amended):	Followed by the text of the claim as amended, in the manner discussed below.
iii. (Canceled)	Without the text of the canceled claim.
iv. (Withdrawn):	Followed by the text of the claim.
v. (New):	Followed by the text of the new claim, without underlining.
vi. (Previously Presented):	Followed by the text of the claim as previously amended, without indications of the amendments.
vii. (Not Entered)	Without the text of the claim.

Example of Listing of Claims:

Claims 1-5 (canceled)
Claim 6 (withdrawn): A bucket with one handle.
Claim 7 (previously presented): A bucket with a handle.
Claim 8 (currently amended): A bucket with a ~~green~~ blue handle.
Claim 9 (withdrawn)
Claim 10 (original): A bucket with a wooden handle.
Claim 11 (canceled)
Claim 12 (new): A bucket with plastic sides and bottom.
Claim 13 (not entered): A black bucket with a wooden handle.

II. Amendments to the Specification:

Amendments to the specification are to be made by presenting replacement paragraphs, sections or a substitute specification marked up to show changes made relative to the immediate prior version, as set out in 37 CFR 1.121(b). The changes should be shown by strikethrough (for deleted matter) or underlining (for added matter). No accompanying "clean" version shall be supplied. The amendments to the specification shall be presented only one time, and will not appear in successive amendment documents.

III. Amendments to the Drawings:

Amendments to the drawing figures shall be made by presenting replacement figures which include the desired changes, without markings, and which comply with § 1.84. The changes shall be explained in the accompanying remarks section of the amendment paper. If the amended drawings are not approved, the applicant will be notified in the next Office action. Any amended drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even though only one figure may be amended. The figure number in the amended drawing should not be labeled as "amended."